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EXAMINER	
NGUYEN, KHAI MINH	
ART UNIT	**PAPER NUMBER**
2617	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/967,048	KASAPI, ATHANASIOS A.	
	Examiner	Art Unit	
	Khai M. Nguyen	2617	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9 and 11-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 11-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-9 and 11-22 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-9 and 11-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shattil (U.S.Pub-20020034191) in view of Stefan Kaiser (Spatial Transmit Diversity Techniques for Broadband OFDM Systems (2000 IEEE)).

Regarding claim 1, Shattil teaches a method comprising:

receiving information for transmission to a receiver (fig.19, 28a-28b, paragraph 0396); and

generating a plurality of sub-carriers (fig.20) to redundantly transmit the information over a multi-carrier wireless communication channel (fig.20, paragraph 0371-0373),

Shattil fails to specifically disclose wherein each of the sub-carriers is to be transmitted over an array of two or more antenna, wherein each of the sub-carriers is modified by a set of complex weights to ensure that each of the sub-carriers of the wireless communication channel propagates along a different physical path to the receiver, wherein the set of complex weights used to modify each of the sub-carriers includes different weights for each of the two or more antenna of the array. However, Stefan Kaiser teaches wherein each of the sub-carriers is to be transmitted over an array of two or more antenna (fig.1, page 1824, section A. subcarriess diversity), wherein each of the sub-carriers is modified by a set of complex weights to ensure that each of the sub-carriers of the wireless communication channel propagates along a different physical path to the receiver (fig.1, page 1824, section A. subcarriess diversity), wherein the set of complex weights used to modify each of the sub-carriers includes different weights for each of the two or more antenna of the array (fig.1, page 1824, section A. subcarriess diversity). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the teaching of the Stefan to Shattil to provide a method for reducing power requirements at each antenna.

Regarding claim 2, Shattil and Stefan Kaiser further teach a method according to claim 1, wherein each element of the set of complex weights scales one or more of a

sub-carriers amplitude and/or phase at an associated transmission antenna (see Shattil, fig.56A and 57A, paragraph 0258, 0374).

Regarding claim 3, Shattil and Stefan Kaiser further teach a method according to claim 1, further comprising developing a set of complex weights including (see Shattil, fig.56A and 57A, paragraph 0258, 0374):

choosing substantially different weights (see Stefan, fig.1, page 1824, section A. subcarriess diversity), for each sub-carrier sharing information; and iteratively repeating until all sub-carriers have been modified (see Stefan, fig.1, page 1824, section A. subcarriess diversity).

Regarding claim 4, Shattil and Stefan Kaiser further teach a method according to claim 3, wherein the substantially different weights are chosen to be orthogonal to the others (see Stefan, fig.1, page 1824, section A. subcarriess diversity).

Regarding claim 5, Shattil and Stefan Kaiser further teach a method according to claim 3, wherein developing a set of complex weights comprises: selecting weight vector(s) to be applied to each of the sub-carriers from a pre-determined set of weight vectors (see Stefan, fig.1, page 1824, section A. subcarriess diversity).

Regarding claim 6, Shattil and Stefan Kaiser further teach a method according to claim 1, further comprising: transmitting the modified sub-carriers (see Stefan, fig.1, page 1824, section A. subcarriess diversity).

Regarding claim 7, Shattil teaches a transceiver comprising:

a diversity agent (fig.66a), operable to selectively apply a set of complex weight values to each of a plurality of signals (fig.56A and 57A, paragraph 0258, 0374), each corresponding to a sub-carrier of a multi-carrier communication channel (paragraph 0253-0254), to introduce spatial diversity between such sub-carriers (fig.33a and 34b, paragraph 0260-0261); and

a transmit module (fig.66a), operable coupled with the diversity agent (fig.66a), to receive the modified sub-carriers (fig.56A and 57A, paragraph 0258, 0374) and transmit the signals to generate the multi-carrier communication channel with intra-channel spatial diversity (fig.20, paragraph 0371-0373).

Shattil fails to specifically disclose wherein each of complex weight values include a plurality of weight values each associated with a different one of a plurality of antennae of an antenna array through which the sub-carriers are transmitted. However, Stefan Kaiser teaches wherein each of complex weight values include a plurality of weight values (fig.1, page 1824, section A. subcarriess diversity) each associated with a different one of a plurality of antennae of an antenna array through which the sub-carriers are transmitted (fig.1, page 1824, section A. subcarriess diversity). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the teaching of the Stefan Kaiser to Shattil to provide a method for reducing power requirements at each antenna.

Regarding claim 8, Shattil and Stefan Kaiser further teach a transceiver according to claim 7, wherein the plurality of signals received from at the diversity agent are baseband signals (see Shattil, paragraph 0015, 0019).

Regarding claim 9, Shattil and Stefan Kaiser further teach a transceiver according to claim 7, wherein the multi-carrier communication channel is comprised of a plurality of sub-carrier signals (see Shattil, paragraph 0253-0254), each having a disparate set of complex weights introduced at a baseband of the sub-carriers to effect the spatial diversity between the sub-carriers (see Stefan, fig.1, page 1824, section A. subcarriess diversity).

Regarding claim 11, Shattil and Stefan Kaiser further teach a transceiver according to claim 7, wherein the transceiver is operable to develop the set of complex weight values for a given baseband signal to be maximally orthogonal complex weight values applied to another baseband signal (see Stefan, fig.1, page 1824, section A. subcarriess diversity).

Regarding claim 12, Shattil and Stefan Kaiser further teach a transceiver according to claim 7, wherein the transceiver is operable to develop a set of complex weight vectors for a sub-carrier (see Stefan, fig.1, page 1824, section A. subcarriess diversity) that are substantially different from weight vectors modifying other sub-carriers that include at least a subset of information carried by the sub-carrier (see Shattil, paragraph 0372-0373).

Regarding claim 13, Shattil and Stefan Kaiser further teach a transceiver according to claim 7, wherein the transmit module is operable to upconvert and amplify each of the modified baseband signals to generate a plurality of spatially diverse sub-carriers (see Stefan, fig.1, page 1824, section A. subcarriess diversity).

Regarding claim 14, Shattil and Stefan Kaiser further teach a transceiver according to claim 13, wherein the transmit module operable to transmit each of the sub-carriers to one or more receiver(s) (see Stefan, fig.1, page 1824, section A. subcarriess diversity).

Regarding claim 15, Shattil teaches a transceiver according to claim 7, further comprising: a memory operable to store content (see Shattil, paragraph 0284); and control logic, coupled to the memory (see Shattil, paragraph 0284), operable to access and process at least a subset of the content to implement the diversity agent (see Shattil, fig.66a).

Regarding claim 16, Shattil and Stefan Kaiser further teach the method of claim 1, wherein the multi-carrier wireless communication channel uses Orthogonal Frequency Division Multiplexing (OFDM) (see Stefan, fig.1, page 1824, section A. subcarriess diversity).

Regarding claim 17, Shattil and Stefan Kaiser further teach the transceiver of claim 7, wherein the multi-carrier communication channel uses Orthogonal Frequency Division Multiplexing (OFDM) (see Stefan, fig.1, page 1824, section A. subcarriess diversity).

Regarding claim 18, Shattil and Stefan Kaiser further teach the transceiver of claim 7, wherein the transceiver is selected from a base station and a wireless telephony subscriber unit (see Stefan, fig.1).

Regarding claim 19, Shattil and Stefan Kaiser further teach the transceiver of claim 7, wherein the transceiver develops the set of complex weights to have inter-channel spatial diversity (see Stefan, fig.1, page 1824, section A. subcarriess diversity) with respect to at least one communication channel of at least one other transceiver (see Stefan, fig.1, page 1824, section A. subcarriess diversity).

Regarding claims 20 and 22, Shattil teaches a subscriber unit (a device) comprising:

a diversity agent (fig.66a), operable to selectively apply a set vector of complex weight values to each of a plurality of signals (fig.56A and 57A, paragraph 0258, 0374), each corresponding to a sub-carrier of a multi-carrier communication channel (paragraph 0253-0254), to introduce spatial diversity between such sub-carriers (fig.33a and 34b, paragraph 0260-0261); and

a transmit module (fig.66a), coupled with the diversity agent (fig.66a), operable to receive the modified sub-carriers (fig.56A and 57A; paragraph 0258, 0374) and transmit the signals to generate the multi-carrier communication channel with intra-channel spatial diversity (fig.20, paragraph 0371-0373).

Shattil fails to specifically disclose wherein the vector of complex weight values applied to each signal includes a plurality of different complex weight values, and wherein each of the different complex weight values is operable to modify both an

amplitude and a phase of a respective signal. However, Stefan Kaiser teaches wherein the vector of complex weight values applied to each signal includes a plurality of different complex weight values (fig.1, page 1824, section A. subcarriess diversity), and wherein each of the different complex weight values is operable to modify both an amplitude and a phase of a respective signal (fig.1, page 1824, section A. subcarriess diversity). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the teaching of the Stefan Kaiser to Shattil to provide a method for reducing power requirements at each antenna.

Regarding claim 21, Shattil and Stefan Kaiser further teach a transceiver according to claim 7, wherein each of the set of complex weight values are comprised of a plurality of weight values each (see Stefan, fig.1, page 1824, section A. subcarriess diversity) associated with one of a plurality of antennae comprising an antenna array through which the sub-carriers are transmitted (see Stefan, fig.1, page 1824, section A. subcarriess diversity).

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khai M. Nguyen whose telephone number is 571.272.7923. The examiner can normally be reached on 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rafael Perez-Gutierrez can be reached on 571.272.7915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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10/11/2007

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